**Career Academy Integrated Unit Plan**

**Academy Name: \_\_\_STEM: Principles of Bio-Med\_\_\_\_\_** **School: \_\_\_University High\_\_\_\_\_**

**Date Created: \_\_\_\_\_6/13/2011\_\_\_\_\_\_\_ Created by: \_Jessica Clayton, Judy Ngying, Jennifer**

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| **Integrated Unit Plan Title:** Hypercholesterolemia & Food Chemistry |
| **Courses to integrate:** Principles of Bio-Med, Chemistry, Algebra |
| **Grade Level:** 10th grade |
| **Timeline & Duration:** 4-5 weeks in 3rd quarter |
| **Essential Question:** How are the Principles of Bio-Med, Chemistry, Algebra, and Geometry utilized to analyze diet which impacts heart health and overall health of the patient? |

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| **Unit Summary:**  Using Principles of Bio-Med, Chemistry, and Algebra II students will analyze composition of food and energy used to maintain a healthy diet to prevent diseases such as Hypercholesterolemia. |

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| **Overview of Activities/Lessons per Course** | | | | |
| Course | Principles of Bio-Med | Chemistry | Algebra | Geometry |
| Activity/Lesson | **Activity 1:**  Students will gain a better understanding of terminology & concepts regarding/relating to hypercholesterolemia | **Activity 1:**  Students will learn the principles of percent composition  Activity will include Analysis of Milk Lab | **Activity 1:**  Students will find and analyze the percent of fat and sodium per food serving from food labels. | **Activity 1:**  Students will geometrically calculate the volume of the heart by segmenting the heart into 4 quadrants and calculating the volume of the 4 polyhedrons to sum up the volume of the heart. |
| Activity/Lesson | **Activity 2:**  Aren’t all Fats the Same Activity - Create models of stearic, stardonic, & triglyceride models for students to have a visual of the molecules their bodies absorb. Integrate Chemistry Activity 1 explaining relevance of fats in diet leading to increased chance of disease. | **Activity 2:**  Students will learn the concepts of stoichiometry.  Activity will include the analysis of NaCl in snack food. |  |  |
|  | **Activity 3:**  Which Molecule Am I? Activity to indicate presence of glucose, starch, proteins, and lipids within food. |  |  |  |
|  | **Activity 4:**  Create HDL/LDL Flyer Activity to create awareness of cholesterol related diseases. |  |  |  |
|  | **Activity 5:**  Food Label Activity – relating food label to nutrients needed within the body. |  |  |  |
|  | **Activity 6:**  How does PCR amplify DNA Activity |  |  |  |
|  | **Activity 7:**  What is Familial Hypercholesterolemia and How is it Diagnosed Activity. |  |  |  |
|  | **Activity 8:**  Wrap up activity including how salt & fat in diet effects the body, specifically the heart, which the volume will be calculated in Geometry. |  |  |  |

**Lesson Instructions for \_\_\_Principles of Bio-Med\_\_\_\_ (course):**

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| **Standards (Performance Tasks or Course Frameworks or Sunshine State Standards):**  07.01, 07.03, 07.05, 08.01, 08.03, 08.04, 09.02, 15.01, 15.02, 15.03, 15.04, 15.05, 19.01, 21.01, 21.02, 21.06  **Rigor & Relevance (quadrant):**  Quadrant D - Adaption: Applies to real world predictable situations and according to Bloom’s Taxonomy it is analysis, synthesis, and evaluation. |
| **Instructions to Teacher:**  Teacher will instruct students on Activities 1-8 by introducing the concepts of hypercholesterolemia and relating such concepts to diet and nutrition within the human body by familiarizing with appropriate terminology, creating various fat molecule models, indicating the presence of starch, protein, glucose, & lipids within various foods, creating a food label, creating awareness of hypercholesterolemia, using PCR to amplify DNA, by figuring out how to diagnose Familial Hypercholesterolemia. |
| **Instructions to Students:**  Complete Activities 1-8 with appropriate instructions and materials dependent upon which activity is to be performed. |
| **Instructions for Student Accommodations:**  Strategic grouping of students, Review PowerPoints when requested, Behavioral Strategies, Classroom placement/arrangement, Extended time for students when needed, organizational strategies, and technology usage. |
| **Assessment for Activity:**  Wrap up Project with a Performance Based Assessment by having students use their new found knowledge on hypercholesterolemia to analyze a pre-existing food label and stating whether or not it is dietary sound. |
| **Approximate Length of Time for Activity:**  4-5 weeks |
| **Materials Needed:**  Lab journal, writing utensil, various lab activities with their corresponding materials (see individual lab for specifics). |
| **Resources Needed:**  PowerPoint, Computer, whiteboard, Activities 1-8, Carbohydrate Molecular Models, various snack food, and PLTW curriculum guide. |
| Attachments: |

**Lesson Instructions for \_\_\_Geometry\_\_\_\_ (course):**

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| **Standards (Performance Tasks or Course Frameworks or Sunshine State Standards):**  MA.912.G.7.1 –Describe and make regular, non-regular, and oblique polyhedral and sketch the net for a given polyhedron and vice versa.  MA.912.G.7.2 – Describe the relationships between the faces, edges, and vertices of polyhedral.  MA.912.G.7.5 – Explain and use formulas for lateral area, surface area, and volume of solids.  **Rigor & Relevance (quadrant):**  Quadrant C – Students extend and refine their acquired knowledge to be able to use that knowledge automatically and routinely to analyze and solve problems and create solutions. |
| **Instructions to Teacher:**  Teacher will prepare the model for the heart and provide an open discussion which will lead the students to creatively think of appropriate polyhedrons that can be used to model the heart. |
| **Instructions to Students:**  Students will creatively think of appropriate polyhedrons that can be used to model the heart and calculate the volume of an average human heart. |
| **Instructions for Student Accommodations:**  Strategic grouping of students, Review PowerPoints when requested, Behavioral Strategies, Classroom placement/arrangement, Extended time for students when needed, organizational strategies, and technology usage. |
| **Assessment for Activity:**  Final assessment to be done in Bio-Med, but class assessment is the completion of the Heart Polyhedron Activity. |
| **Approximate Length of Time for Activity:**  1-2 weeks |
| **Materials Needed:**  Pencil, paper, and thinking caps. |
| **Resources Needed:**  Mobiboard, projector, and computer. |
| Attachments: |

**Lesson Instructions for \_\_\_\_\_Chemistry\_\_\_\_\_\_ (course):**

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| **Standards (Performance Tasks or Course Frameworks or Sunshine State Standards):**  SC.912.N.1.1-7;SC.912.N.4.1-2;LA.910.2.2.3;LA.910.4.2.2;LA.910.5.1.2;LA.910.5.3.2;SC.912.P.8.1-2;SC.912.P.10.1-2,6-7;SC.912.P.8.6-9  **Rigor & Relevance (quadrant):** B, C |
| **Instructions to Teacher:**  Activity 1: Teacher will present power point presentation of mathematical concepts pertaining to percent composition  Teacher will present protocol and implement lab experiment concerning analysis of milk  Activity 2: Teacher will present power point presentation of stoichiometry concepts including practice worksheets  Teacher will present protocol and implement lab experiment concerning analysis of NaCl of snack food |
| **Instructions to Students:** Students are expected to take notes on percent composition and stoichiometry.  Students are expected to work in pairs to demonstrate percent composition by implementing the analysis of milk activity.  Students are expected to work in pairs to demonstrate principles of stoichiometry implementing the analysis of NaCl in snack foods. |
| **Instructions for Student Accommodations:**  Strategic grouping of students, Review PowerPoints when requested, Behavioral Strategies, Classroom placement/arrangement, Extended time for students when needed, organizational strategies, and technology usage. |
| **Assessment for Activity:**  Activity1: worksheets and summative test including percent composition. Detailed lab write up assessed with rubric.  Activity 2: worksheets and summative test including percent composition. Detailed lab write up assessed with rubric. |
| **Approximate Length of Time for Activity:**  Total time for both concepts and activities will encompass 4 weeks time. |
| **Materials Needed:**  Worksheets, tests, lab protocols and rubrics. See attachments for lab requirements. |
| Attachments: <http://dwb4.unl.edu/chem_source_pdf/FOOD.pdf> |

**Lesson Instructions for Algebra II :**

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| **Standards (Performance Tasks or Course Frameworks or Sunshine State Standards ):**  MA.912.A.1.4 – perform operations on real world numbers (percents)  MA.912.A.2.1&2 – create and interpret a graph to represent a real-world situation  MA.7.A.1.2 – find the percent of change (increase or decrease)  MA.7.A.1.6 – convert units from one to another  **Rigor & Relevance (quadrant):** Quadrant B: Application – Students use acquired knowledge to solve problems, design solutions, and complete work. The highest level of application is to apply knowledge to new and unpredictable situations. |
| **Instructions to Teacher:**  Teacher will print up lab sheets, provide snacks and labels, review key concepts of ratios, percents and unit conversions, arrange students into lab groups and facilitate the student guided lab. Send report of results to Principles of Bio-Med. |
| **Instructions to Students:**  Students will analyze the data, calculate percents, plot calculations on scatter plots, describe patterns and examine graphs to determine if there are relationships between the variables.  Students will use their data to determine if the marketing is accurate. |
| **Instructions for Student Accommodations:**  Strategic grouping of students; Review PowerPoint when requested; Behavioral Strategies; Classroom placement/arrangement; Extended time for students when needed; organizational strategies; and technology usage. |
| **Assessment for Activity:**  Informal assessment throughout activity; completed worksheet; cumulative group project will be graded in Biomedical STEM class. |
| **Approximate Length of Time for Activity:**  Approximately one week of 50 minute class periods |
| **Materials Needed:**  Pencil, calculator, snacks with individual nutrition labels, PowerPoint presentation slides, Food Label Analysis packet |
| **Resources Needed:**  PowerPoint, mobi board |
| Attachments: <http://dwb4.unl.edu/chem_source_pdf/FOOD.pdf>  Food Label Analysis Lab Packet |